

**Request to Archive  
With The National Centers for Environmental Information  
For High-Resolution Rapid Refresh (HRRR)  
Provided by NCEP**

**2014-07-25**

This information will be used by NCEI to conduct an appraisal and make a decision on the request.

**1. Who is the primary point of contact for this request?**

Jeff Budai  
NCDC  
(828) 271-4454  
jeff.budai@noaa.gov

**2. Name the organization or group responsible for creating the dataset.**

National Centers for Environmental Prediction (NCEP)

**3. Provide an overview summarizing the scope of data you want to archive. Describe the outputs, data variables, including their measurement resolution and coverage.**

The HRRR is a NOAA real-time 3-km resolution, hourly updated, cloud-resolving atmospheric model, initialized by 3km grids with 3km radar assimilation over a 1-h period (since 5 April 2013), adding further detail to the HRRR initial conditions otherwise determined by the hourly data assimilation from the 13km radar-enhanced Rapid Refresh (ESRL version). An experimental version of the HRRR model is run in real-time at NOAA/ESRL, and an operational version of the HRRR is planned to start running at NCEP on 16 September 2014. The experimental version of the HRRR started to run in 2010 and will continue to run after NCEP implementation. Yearly upgrades are made in the HRRR-ESRL and ESRL-RAP configuration, the last in March-April 2014, which was complete on 11 April 2014.

The HRRR is the only hourly-updated, radar-initialized, storm-resolving model running at this time over the US or internationally (to the best of ESRL's knowledge).

As a higher-resolution nest inside the hourly-updated Rapid Refresh (and before 4/14/2011, the RUC), the HRRR is designed to

- provide rapidly updated model guidance on convective storms for air traffic management, severe weather forecasting, and the NOAA National Weather Service Warn-On Forecast;
- eventually provide improved background fields for NWS Real-Time Mesoscale Analysis, and
- provide improved basis for other aviation hazard forecasts (e.g., wake vortex, ceiling, visibility, turbulence, inflight icing, terminal forecasts).

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Variables

Please visit the following URL's for documents describing available variables:

HRRR GRIB2 Table 2-D Hourly: [http://ruc.noaa.gov/hrrr/GRIB2Table\\_hrrr\\_2d.txt](http://ruc.noaa.gov/hrrr/GRIB2Table_hrrr_2d.txt)  
HRRR GRIB2 Table 2-D 15 min: [http://ruc.noaa.gov/hrrr/GRIB2Table\\_hrrr\\_subh.txt](http://ruc.noaa.gov/hrrr/GRIB2Table_hrrr_subh.txt)  
HRRR GRIB2 Table Native: [http://ruc.noaa.gov/hrrr/GRIB2Table\\_hrrr\\_nat.txt](http://ruc.noaa.gov/hrrr/GRIB2Table_hrrr_nat.txt)  
HRRR GRIB2 Table Press: [http://ruc.noaa.gov/hrrr/GRIB2Table\\_hrrr\\_prs.txt](http://ruc.noaa.gov/hrrr/GRIB2Table_hrrr_prs.txt)

**4. What is the time period covered by the dataset? (YYYY-MM-DD, YYYY-MM or YYYY)**

From 2014-09-16

Ongoing as continuous updates to the data record

**5. Edition or version number(s) of the dataset:**

ESRL RAPv3/HRRR-2014 - 11 April 2014

**6. Describe the level to which the data are processed. For example, are these unprocessed raw observations, derived parameters, quality controlled or inter-calibrated data, etc.?**

The HRRR is a higher-resolution nest inside the hourly-updated Rapid Refresh (and before 4/14/2011, RUC) model.

**7. Approximate date when the dataset was or will be released to the public:**

2014-09-16

**8. Who are the expected users of the archived data? How will the archived data be used?**

Aviation:

- Aviation Weather Center (AWC): 2-D grids
- Federal Aviation Administration (FAA) Command Center
- National Center for Atmospheric Research (NCAR): 2-D, 3-D, 15-min grids
- Operational evaluation in CoSPA

Severe Weather:

- Storm Prediction Center (SPC): 2-D grids
- Operational severe weather forecasting and evaluation
- National Severe Storms Laboratory (NSSL): 2-D, 3-D and 15-min grids
- Mesoscale analysis, Short-term precipitation forecasts
- National Centers for Environmental Prediction (NCEP): 15-min grids
- Real Time Mesoscale Analysis (RTMA)

Forecasting:

- National Weather Service (NWS): 2-D and 3-D grids
- Operational weather forecasting
- Weather Prediction Center (WPC): 2-D grids
- Quantitative precipitation forecasting
- United States Air Force (USAF): 2-D grids
- Operational weather forecasting
- Air Resources Laboratory (ARL): Tiled 3-D HRRR grids
- Dispersion forecasts, Local wind forecasts in complex terrain

Renewable Energy:

- Department of Energy/NOAA Wind Forecast Improvement Project (WFIP)
  - ~12 energy private sector companies via WFIP (WindLogics, 3Tier,
  - AWS Truepower, Iberdrola, Weather Channel, etc.)
  - Real-time forecasts of turbine-level wind and solar irradiance
- Colorado State University (CSU/CIRA): 2-D grids
  - Verification of solar irradiance forecasts at SURFRAD sites

**9. Has the dataset undergone user evaluation and/or an independent review process? Did NCEI participate in design reviews?**

The NOAA Wind Forecast Improvement Project (WFIP) (<http://www.esrl.noaa.gov/psd/psd3/wfip/>) is a DOE sponsored research project that aims to improve the skill of NOAA's short-term weather forecast models at predicting foundational weather parameters (for example, wind speed, turbulence intensity, and icing conditions) that impact wind energy generation. WFIP participants include several DOE and NOAA research laboratories, the National Weather Service, and partners from the private sector (WindLogics, 3Tier, AWS Truepower, Iberdrola, Weather Channel, etc.)

The core elements of WFIP include:

- Assimilation of the remote sensing, tall tower, and nacelle data sets into NOAA's developmental HRRR numerical weather prediction model
- Dissemination of the HRRR model output to the wind energy industry, including WFIP private sector partners
- Forecasting wind power production (by DOE and private sector partners) based on HRRR output
- Evaluation of the economic benefit of the HRRR model, with and without assimilation of the new observations

**Activities & Outcomes**

Two private sector groups were selected by DOE to partner with DOE and NOAA on WFIP, and therefore two geographic regions will be studied. The first private sector group is led by WindLogics, and will cover the northern Great Plains region. The second private sector group is led by AWS Truepower, and will cover an area of the southern Great Plains centered on west Texas. The instruments deployed in the two study areas are shown in the figures above. WFIP will span one full year of data collection, forecasting and economic evaluation, with an anticipated start date of July 2011. Links to public model evaluation web pages for the northern and southern study domains can be found at <http://wfip.esrl.noaa.gov/psd/programs/wfip/North/> and <http://wfip.esrl.noaa.gov/psd/programs/wfip/South/>

**10. Describe the dataset's relationship to other archived datasets, such as earlier versions or related source data. If this is a new version, how does it improve upon the previous version(s)?**

The HRRR is fully dependent on the hourly-updated, radar-assimilating Rapid Refresh (RAP) model; and prior to 4/14/2011, the radar-enhanced Rapid Update Cycle (RUC) model. The RAP is produced by NCEP and is currently being archived at NCDC. The RUC was produced by NCEP and is archived at NCDC. RAP and RUC model data are available to users through NCDC's National Operational Model Archive & Distribution System (NOMADS).

**11. List the input datasets and ancillary information used to produce the data.**

The HRRR is a higher-resolution nest inside the hourly-updated Rapid Refresh (and before 4/14/2011, RUC) model.

The HRRR model uses WRFv3.5.1+, including the following physics, numerics, and assimilation changes.

Physics:

- MYNN PBL update - Olson version
- RUC LSM update
- Thompson microphysics v3.5.1
- RRTMG radiation scheme
- MODIS veg fraction/leaf area index

Numerics changes:

- 6th order diffusion in flat terrain
- Smooth terrain at latitude boundary conditions

Assimilation:

- 3km hybrid ens/var assimilation (was var-only in 2013)
- 8m to 2m bkg for surface dew point assimilation
- Radar LH 4x less intense than 2013 (2x less intense than RAP but more local)

**12. List web pages and other links that provide information on the data.**

Unknown at this time (25Jul2014)

**13. List the kinds of documents, metadata and code that are available for archiving. For example, data format specifications, user guides, algorithm documentation, metadata compliant with a standard such as ISO 19115, source code, platform/instrument metadata, data/process flow diagrams, etc.**

1. <http://ruc.noaa.gov/hrrr/>  
<http://rapidrefresh.noaa.gov/hrrr/>

**14. Indicate the data file format(s).**

1. GRIB 2

**15. Are the data files compressed?**

No

**16. Provide details on how the files are named and how they are organized (e.g., file\_name\_pattern\_YYYYMM.tar in monthly aggregations).**

From NCEP Central Operations on 22Jul2014: "NCEP/EMC is working on an NWS TIN (Technical Implementation Notice) that should have a lot of the information you're looking for, I'll let you know when it is available. We also hope to start a parallel feed of the HRRR to our FTP server sometime next week, I'll keep you in the loop."

**17. Explain how to access sample data files and/or a file listing for previewing. If it is not available now, when will it be available?**

**18. What is the total data volume to be submitted?**

**Continuous Data: data volume rate for a continuous data production.**

Total Data Volume Rate: 1.9GB per Day

Data File Frequency: 1 per Day

Data Production Start: 2014-09-16

**19. Are later updates, revisions or replacement files anticipated? If so, explain the conditions for submitting these additional data to the archive.**

No additional updates, revisions or replacement data are anticipated.

**20. Describe the server that will connect to the ingest server at NCEI for submitting the data.**

Physical Location: NCEP Central Operations  
System Name: NCEP Central Operations  
System Owner: NCEP Central Operations  
Additional Information:

**21. What are the possible methods for submitting the data to NCEI? Select all that apply.**

1. FTP PULL

**22. Identify how you would like NCEI to distribute the data. Web access support depends on the resources available for the dataset.**

1. Direct download links
2. Advanced web services (e.g., THREDDS Catalog Service)

**23. Will there be any distribution, usage, or other restrictions that apply to the data in the archive?**

No known constraints apply to the data.

**24. Discuss the rationale for archiving the dataset and the anticipated benefits. Mention any risks associated with not archiving the dataset at NCEI.**

The HRRR is a unique dataset in that it is a 3-km resolution, hourly updated, cloud-resolving atmospheric model, initialized by 3km grids with 3km radar assimilation over a 1-h period. The HRRR is the only hourly-updated, radar-initialized, storm-resolving model running at this time over the US or internationally (to the best of ESRL's knowledge).

As of 25 July 2011, HRRR forecasts have been used for experimental renewable energy guidance under the DOE/NOAA Wind Forecast Improvement Project (WFIP) with verification against WFIP profilers and sodars.

Access to these HRRR data will be vital to future studies of this new modeling and data assimilation process. NCDC already archives the parent RAP/RUC datasets. The HRRR is a branch of this modeling family, and it makes logical sense to have these HRRR data archived at NCDC along with RAP and RUC data.

**25. Are the data archived at another facility or are there plans to do so? Please explain.**

No

**26. Is there an existing agreement or requirement driving this request to archive? Have you already contacted someone at NCEI?**

No

**27. Do you have a data management plan for your data?**

No

**28. Have funds been allocated to archive the data at NCEI?**

No

**29. Identify the affiliated research project, its sponsor, and any project/grant ID as applicable.**

The HRRR is run by NOAA/ESRL/GSD as a real-time demonstration and with operational implementation at NCEP

planned for 16 Sept 2014.

**30. Is there a desired deadline for NCEI to archive and provide access to the data?**

Archive by: 2014-09-16

Accessible by:

**31. Add any other pertinent information for this request.**

NOAA Earth System Research Laboratory HRRR Homepage

<http://ruc.noaa.gov/hrrr/>

Data volumes in #17 come from NWS TIN:

NOUS41 KWBC 181603 CCA

PNSWSH

Technical Implementation Notice 14-28, Corrected

National Weather Service Headquarters Washington DC

1205 PM EDT Fri Jul 18 2014